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## Results of the Archbold Expeditions. No. 69 A Review of New Guinea Lizards Allied to *Emoia baudini* and *Emoia physicae* (Scincidae)

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Few genera of the family Scincidae are more in need of revision than is *Emoia*. This report deals with only two sections of the genus—groups largely confined to New Guinea. Although this review is based primarily on the collections assembled by the Archbold Expeditions of the American Museum of Natural History (see Archbold, Rand, and Brass, 1942), material in other collections has been included. I have thus been able to deal with larger samples and hence to reach more reliable conclusions than would have been possible had I restricted my studies to the single collection.

Names of institutions containing specimens discussed in this paper are abbreviated as follows:

A.M.N.H., the American Museum of Natural History  
C.N.H.M., Chicago Natural History Museum  
C.P.S., College of Puget Sound  
M.C.Z., Museum of Comparative Zoölogy, Harvard College  
N.H.M.S.U., Natural History Museum, Stanford University

A group of eight species of small- to moderate-sized, ground-dwelling *Emoia*, which are relatively primitive or even degenerate with respect to the nature of the subdigital lamellae, is largely confined to New Guinea, the islands at its southeastern tip, and islands to the west as far as Macassar Strait. The lamellae are only slightly or moderately broadened be-

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neath the basal phalanges; the number beneath the fourth toe is generally fewer than 40; the number of midbody scale rows ranges from 30 to about 40; the dorsal scales are always smooth in the adults and the habitus is slender to relatively stocky.

The descriptions in the literature that refer to members of this group are: *E. baudini* (Duméril and Bibron), *E. mehelyi* (Werner), *E. pallidiceps* (De Vis), *E. submetallica* (Macleay), *E. mivarti obscura* (de Jong). Of these, *E. mehelyi* is a synonym of *E. pallidiceps*, and *E. mivarti obscura* is a subspecies of *E. submetallica*.

The distributional patterns given in the present paper are based entirely on the collections included in the present study and should not be interpreted as necessarily marking the limits of the ranges of the species or subspecies involved. Our knowledge of the habitat niches of these species is also very limited. The subspecies of *Emoia submetallica* from the Balim Valley was collected in grassland or cultivated areas (Archbold, Rand, and Brass, 1942); that from the Idenburg Valley in forest or swamp forest areas in all probability; that from Kubuna or Mafulu might be from either forest or grassland (Archbold and Rand, 1935). Single examples, here referred to *Emoia p. physicae* and another subspecies of *Emoia submetallica*, were collected by the author in the leaf debris on the swampy forest floor back of the beach at Cape Endaiadere, Papua, New Guinea.

Eight other descriptions refer to a group of closely related New Guinea species possessing lamellae that may be more modified, but they cannot be distinguished from the above on the basis of scale or lamellar counts alone, and the species themselves are much more wide ranging (for example, *E. mivarti*). These will be treated in another paper.

### THE BAUDINI GROUP

#### *Emoia baudini baudini* (Duméril and Bibron)

##### Figure 1

*Eumeces baudini* DUMÉRIL AND BIBRON, 1839, *Erpétologie général*, vol. 5, p. 653; New Guinea.

MATERIAL: Two (M.C.Z. No. 7695 and one uncatalogued), Manokwari, Dutch New Guinea (Thomas Barbour), 1907; six (C.N.H.M. Nos. 15506–15511), Manokwari, Dutch New Guinea (W. A. Weber and F. C. Wonder), 1929.

During the past century there has been much confusion concerning diagnostic characteristics and limits of variability of this species. The original description is inadequate in that scale or lamellar counts were

not given, and the species was stated (Duméril and Bibron, 1839, p. 653) to be near *Eumeces freycineti* (= *atrocostata*) but more stocky in build. Boulenger (1887), on the basis of two specimens cited, added further to the confusion when he referred *Emoia physicae* (Duméril and Bibron) to the synonymy of *E. baudini*, for the two are quite distinct.

I am greatly indebted to Dr. Jean Guibé of the Muséum National d'Histoire Naturelle, Paris, who has reexamined the specimens on which Duméril and Bibron's description was based and has made it possible to determine to which of several related species the name *baudini* should be applied. Scale counts and pertinent measurements of the cotypes are included in table 1.

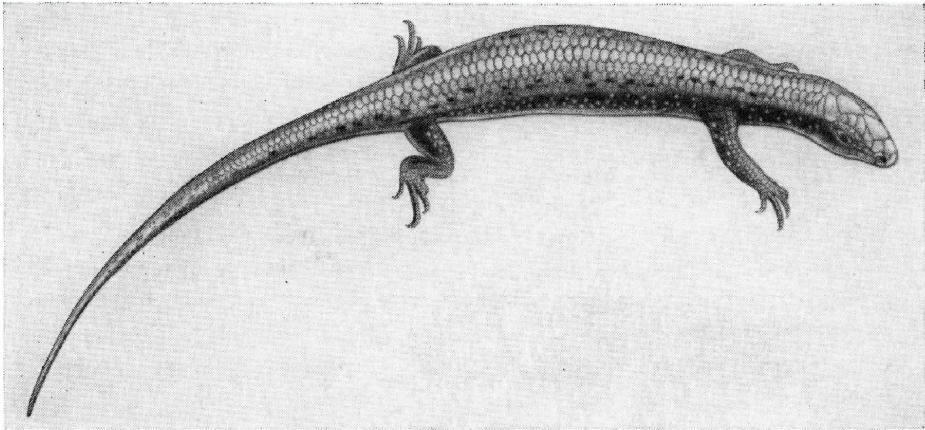


FIG. 1. *Emoia baudini baudini*.

DESCRIPTION: A small *Emoia*, snout to vent length of available, mature specimens 30 to 46 mm.; habitus moderately stocky; limbs less well developed than for most *Emoia* (ratio of the length of the hind limb to snout to vent length 34.7 to 40.6 per cent; mean,  $37.3 \pm 2.45$  for five adult specimens); head narrow; snout bluntly round-pointed; supranasals narrow, elongate, in contact with the anterior loreal, which is much shorter and broader (higher) than the posterior; prefrontals widely separated; interparietal consistently absent; frontal longer than the frontoparietal; a single pair of nuchals; supraoculars four, plus a small one posteriorly; generally four supralabials anterior to the one beneath the orbit which is the largest, its length more than half of its distance from the rostral; number of scale rows around the middle of the body 30–36 ( $34.3 \pm 0.634$ ); number of lamellae beneath the fourth toe 27–31 ( $29.3 \pm 0.345$ ); number of scale rows along the middorsal line from the parietals to the base of the tail 47–50 ( $49.3 \pm 0.29$ ) for the three cotypes and eight specimens from Manokwari, Berau Peninsula, Dutch

New Guinea. This sample of 11 specimens is very uniform. Scale rows across the nape from ear to ear generally 12; ear opening generally nearly smooth; dorsal scales smooth; limbs and toes short; the length of the hind limb generally less than the distance from the axilla to the groin (72.2 to 95.5 per cent for five adult specimens; mean, 83.7 per cent  $\pm 10.09$ ).

COLOR: The color (in alcohol) of the broad dorsal band is somewhat variable and iridescent, ranging from metallic green (Maerz and Paul, 1930, p. 53, pl. 15) to olive brown or whippet (*op. cit.*) with dark brown to black markings along the dorsolateral area often present; the lateral surfaces of trunk, neck, and head are generally dark brown to black,

TABLE 1  
SCALE COUNTS AND BODY LENGTH OF SUBSPECIES OF  
*Emoia baudini*

	Midbody Scale Rows	Fourth- Toe Lamellae	Scale Rows Between Parietals and Base of Tail	Length from Snout to Vent in Mm.	Sex
<i>Emoia baudini baudini</i>					
Cotype (Paris museum)	36	30/30	49/50	46.5	—
Cotype	36	29/30	49/50	35	—
Cotype	36	30/29	49/50	31.5	—
C.N.H.M. No. 15506	34	27	49/50	18	Juv.
C.N.H.M. No. 15507	33	30	49/50	37.5	Gravid ♀
C.N.H.M. No. 15508	32	29	49/50	31	♀
C.N.H.M. No. 15509	36	30	47/48	37	♂
C.N.H.M. No. 15510	36	28	49/50	41	♂
C.N.H.M. No. 15511	32	30	48/49	29	Young ♂
M.C.Z. No. 7695a	36	31	50/51	—	—
M.C.Z. No. 7695b	30	28	49/50	—	Juv.
<i>Emoia baudini</i> , new subspecies					
M.C.Z. No. 7694	32	34	45	42	♀
C.N.H.M. No. 14006	31	30	45	45	♂
C.N.H.M. No. 43172	32	34	47	39.5	Gravid ♀
C.N.H.M. No. 65302	30	31	45	45	♂
C.N.H.M. No. 65303	31	33	46	45	Gravid ♀
C.N.H.M. No. 65304	32	30	45	41	♂
C.N.H.M. No. 65305	30	36	45	—	♀
A.M.N.H. No. 61960 <sup>a</sup>	33	37	43	42.5	♂

<sup>a</sup> This specimen came to my attention after this paper was written and for that reason was not included in the analysis (table 2).



varyingly spotted with white or pale blue (spots in general the size of a single scale). The brown or black of the lateral surfaces extends forward on the snout along the upper part of the loreals and the lower edge of the prefrontals; the band is present behind the hind limbs only as scattered brown spots near the base of the tail. The lower lateral surfaces are heavily blotched with bluish white or tan of the ventral surface. The basal portion of the tail is more or less like the dorsal band, becoming lighter brown (more nearly raw umber; Maerz and Paul, 1930, p. 53, pl. 15) towards the tip. The venter is bluish or grayish white on head and body, except for the chin area, which tends towards ivory; it is more nearly tan or straw colored on the region of the hind limbs and beneath the tail.

RANGE: Known positively from the Manokwari area, Dutch New Guinea.

As indicated in tables 1 and 2, particularly with respect to such characters as the number of fourth-toe lamellae and the number of scale rows along the middorsal line from parietals to base of tail, the material examined in the present study may best be considered as two populations probably subspecifically related, though the area of intergradation is unknown at this time. The known ranges of these two subspecies is

TABLE 2  
ANALYSIS OF VARIANCE IN SCALE COUNTS OF  
*Emoia baudini baudini* AND *Emoia baudini verecunda*

	d <sup>2</sup>	Degrees of Freedom	Variance Estimate	F Value	Probability
Midbody scale rows					
Variation between samples	43.84	1	43.84	11.8	<0.01
Variation within samples	59.69 <sup>a</sup>	16	3.73		
Fourth toe lamellae					
Variation between samples	46.75	1	46.75	14.1	<0.01
Variation within samples	52.69	16	3.29		
Scale rows from parietals to base of tail					
Variation between samples	65.07	1	65.07	67.1	Highly significant
Variation within samples	15.55	16	0.97		

<sup>a</sup> Because of the small size of the samples, Bessel's correction was applied to the variance of each sample before the variation within samples was determined.

shown in figure 2. When the variance exhibited by the two samples is analyzed for three presumably independent characteristics (number of fourth-toe lamellae, number of midbody scale rows, and number of scale rows along the middorsal line from parietal to base of tail) as shown in table 2, the evidence very strongly indicates that we are not dealing with a homogeneous population.

*Emoia baudini verecunda*, new subspecies

*Emoia baudinii pallidiceps* (part) LOVERIDGE, 1948, Bull. Mus. Comp. Zool., vol. 101, p. 370.

TYPE MATERIAL: Holotype (C.N.H.M. No. 65302), Marienberg, Sepik River, Australian New Guinea (W. A. Weber and F. C. Wonder), 1929. Paratypes: Three (C.N.H.M. Nos. 65303–65305), same data as holotype; one (C.N.H.M. No. 14006), Kanganaman, Sepik River, Australian New Guinea (K. P. Schmidt), 1929; one (C.N.H.M. No. 43172), Hollandia, Dutch New Guinea (Harry Hoogstraal), 1944; one (M.C.Z. No. 7694), Woöi Bay, Jobi Island, Dutch New Guinea (Thomas Barbour), 1907; one (A.M.N.H. No. 61960), Hollandia, Dutch New Guinea (W. B. Richardson), 1938.

DIAGNOSIS: A small *Emoia* that differs from the typical race primarily in generally lower number of midbody scale rows (30–32; mean,  $31.1 \pm 0.316$ ); lower number of scale rows along the middorsal line from the parietals to the base of the tail (45–47; mean,  $45.4 \pm 0.275$ ); and the generally greater number of lamellae beneath the toes (30–36; mean,  $32.6 \pm 0.805$ ). See table 2.

RANGE: Known at present from the Sepik River basin, the Hollandia area, and Jobi Island (fig. 2).

Werner (1899, p. 371) showed that two species of *Emoia*, of about the same size and with certain superficial similarities in basic color pattern, occur in the Madang area of New Guinea, and named *mehelyi* the one he regarded as new; the other he referred to *mivarti*. Loveridge (1948, p. 370) recognized the even closer agreement in color pattern of *mehelyi* with a species described as *pallidiceps* by De Vis in 1890 and concluded that Werner and De Vis had dealt with populations of the same species. The material used in the present study, which includes collections from the general type locality of both *mehelyi* and *pallidiceps*, indicates that Loveridge's conclusion is correct. Although the eight specimens from the St. Joseph River area, type locality of *pallidiceps*, are in general darker, this may be due to preservation, and at present there are not sufficient grounds for regarding these populations as sub-specifically distinct. However, a distinct subspecies does occupy the

coastal drainage systems from Aitape to Hollandia as far as known at present (fig. 3). Although the material studied by De Vis is not at this time available to me, his description suggests that his cotypes included examples of two very similar species revealed by the present collection from the St. Joseph River district. The name *pallidiceps* must be restricted to that species the description of which follows. The other species apparently represented in De Vis' cotypes was earlier (1877) described under the name of *submetallica* by Macleay.

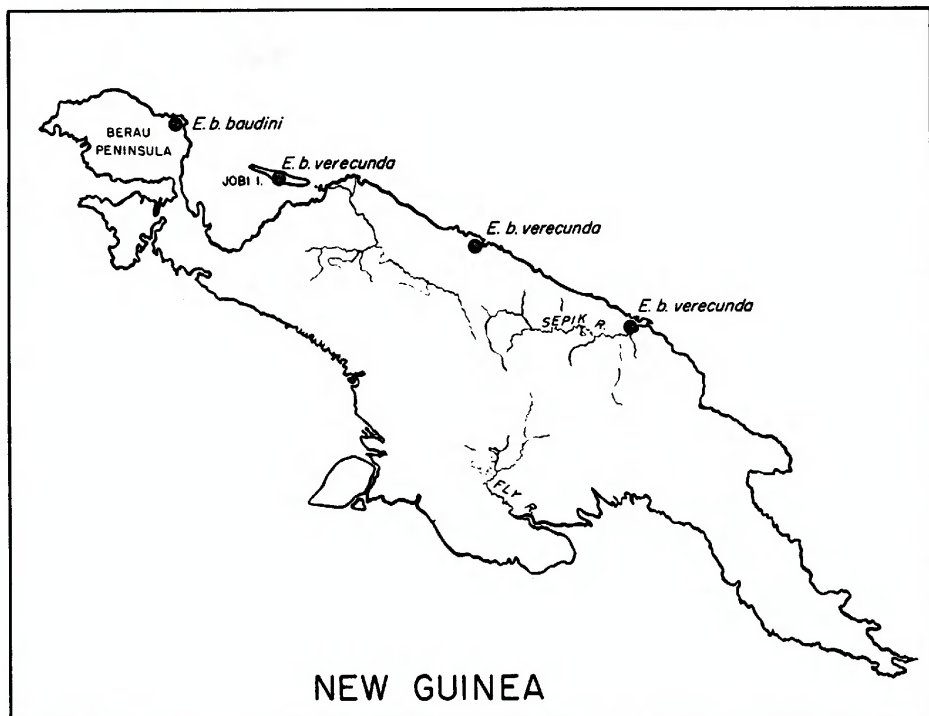


FIG. 2. Known ranges of *Emoia baudini baudini* and *E. b. verecunda*.

*Emoia pallidiceps pallidiceps* De Vis

*Emoia pallidiceps* (part?) DE VIS, 1890, Proc. Linnean Soc. New South Wales, ser. 2, vol. 5, p. 497; St. Joseph River area, Papua, New Guinea.

*Lygosoma mivarti* (part) MEHELY, 1898, Termes. Füz., vol. 21, p. 169.

*Lygosoma mehelyi* WERNER, 1899, Zool. Anz., vol. 22, p. 371; Madang, Australian New Guinea.

*Emoia baudinii pallidiceps* (part) LOVERIDGE, 1948, Bull. Mus. Comp. Zool., vol. 101, p. 370.

MATERIAL: Eight (A.M.N.H. Nos. 59009, 59010, 59023, 59024, 59034, 59184, 59187, 59198), Mafulu, St. Joseph River district, Papua, New Guinea (Archbold Expeditions), 1933; 21 (A.M.N.H. Nos. 62416–

62431, 62447–62451), 4 kilometers southwest of Bernhard Camp, Idenburg River, Dutch New Guinea (Archbold Expeditions), 1938; four (C.N.H.M. Nos. 13942, 13943, 13947, 13956), Madang, Australian New Guinea. (K. P. Schmidt), 1929; 34 (C.N.H.M. Nos. 36618, 65247–65279), Marienberg, New Guinea (W. A. Weber and F. C. Wonder), 1929; ?two (M.C.Z. Nos. 47098–47099), Mt. Wilhelm, Papua, New Guinea (P. J. Darlington, Jr.), 1944; ?four (M.C.Z. No. 7693 and three uncatalogued), Ansoes, Jobi Island, Dutch New Guinea (Thomas Barbour), 1907.

DESCRIPTION: A small *Emoia* (mature individuals measure 31 to 52 mm. from snout to vent); habitus moderately slender; the snout round-pointed and only moderately depressed; the anterior loreal shorter and broader (higher) than the posterior, in contact with the supranasal; the prefrontals generally separate (in contact in only three of 42 specimens checked); supranasals narrow, elongate; the supralabial beneath the orbit (generally the fifth) largest, its length more than half of its distance from the rostral; interparietal absent; frontal shorter than the frontoparietals; a single pair of nuchals; 10 to 12, occasionally 13 rows of scales across the nape from ear opening to ear opening; number of rows of scales around the middle of the body 32–38; for 56 specimens, one specimen with 42; number of lamellae beneath the fourth toe 33–41 for 57 specimens (fig. 5); number of rows of scales along the middorsal line from the parietals to the base of the tail 46–56 for 54 specimens; limbs well developed, the length of the hind limb slightly less to slightly greater than the distance from the axilla to the groin (46.8 to 52.9; mean, 49.6 per cent  $\pm 1.513$  for 26 specimens).

COLOR: The color (in preservative) on the dorsum is generally greenish, greenish brown, or tan, occasionally grayish or dusky. This dorsal band is six to six and two-half scale rows wide on the body, four and two-half scale rows wide at the nape. It is generally marked by two longitudinal rows of brown spots, widely scattered or at times almost forming a stripe on either side posterior to the region of the fore limbs. Thus the broad dorsal band is more or less broken into a central light stripe about two scale rows in width and a dorsolateral light stripe, one plus scale rows in width, a condition that also obtains in *E. mivarti*. The lateral surfaces are brown at least to the level of the limbs or generally more ventrad; broken by a narrow, somewhat irregular, whitish line (one-half, one, or two-half rows in width, extending from the ear region, not from the tip of the snout) posteriorly above the fore limb to the groin. This dark brown band on the upper, lateral surfaces of the body, which is four to five or possibly six scale rows in width, extends pos-



teriorly on the tail, gradually tapering and fading, and anteriorly on the head, where it also fades somewhat. The lateral white line is continuous with a white diagonal line on the upper fore limb and generally a pale line on the upper hind limb. (See fig. 6.) The venter is bluish or greenish white to dark grayish, apparently depending upon conditions of preservation. The limbs are generally brownish on the upper surfaces, more or less flecked with light and dark. The toes are frequently white-tipped as noted by Mehely (1898, p. 169).

VARIATION: There is only moderate variation in the scale counts or general color pattern in the collections examined in the present study as shown in table 3. Four specimens from Jobi Island are tentatively referred to this subspecies, since the white line on the lateral surface tends to be broken, and in general they are lighter in color. The specimens from Kokoda and Mt. Wilhelm, having fewer lamellae and lacking the dark bars on the lips, are questionable.

TABLE 3

SCALE COUNTS OF SAMPLES OF *Emoia pallidiceps* FROM DIFFERENT LOCALITIES

Locality	Midbody Scale Rows	Fourth-Toe Lamellae	Scale Rows Between Parietals and Base of Tail
Mafulu, Papua, New Guinea (St. Joseph River area)	$34 \pm 0.395$ $N = 8$	$35.5 \pm 0.433$ $N = 8$	$50.4 \pm 0.724$ $N = 7$
Astrolabe Bay, British New Guinea	$34 \pm 0.408$ $N = 6$	$39.3 \pm 0.631$ $N = 6$	$49 \pm 0.938$ $N = 5$
Mariensberg, British New Guinea	$35.1 \pm 0.263$ $N = 32$	$37.8 \pm 0.293$ $N = 34$	$52.2 \pm 0.215$ $N = 33$
Pionierbivak, Dutch New Guinea	34 $N = 1$	40 $N = 1$	48 $N = 1$
Idenburg River, Dutch New Guinea	$36.4 \pm 0.359$ $N = 19$	$35.1 \pm 0.362$ $N = 21$	$50.8 \pm 0.594$ $N = 21$

$N$ , number of specimens.

RANGE: This subspecies, based on available collections, occupies the southern drainage in the St. Joseph River district and the northern drainages of at least the Astrolabe Bay region, the Sepik River, and the Mamberamo River. Collections from the coastal drainage systems in the Humboldt Bay and Aitape regions show these areas to be occupied by a distinct race of *pallidiceps* (fig. 3).

*Emoia pallidiceps maxima*, new subspecies

*Emoia baudinii baudinii* LOVERIDGE, 1948, Bull. Mus. Comp. Zool., vol. 101, p. 369.

TYPE MATERIAL: Holotype (C.N.H.M. No. 43143), Hollandia, Dutch New Guinea (D. B. Vogtman), February, 1944. Paratypes: One (A.M.N.H. No. 61957), Hollandia, Dutch New Guinea (Archbold Expeditions), 1938; seven (C.N.H.M. Nos. 43144–43147, 43168, 43169, 43173), Hollandia, Dutch New Guinea (H. Hoogstraal), 1944; one (C.N.H.M. No. 43165), Hollandia, Dutch New Guinea (William Neilon), 1945; two (C.N.H.M. Nos. 43166, 43167), Hollandia, Dutch New Guinea (S. G. Jewett, Jr.), 1945; two (M.C.Z. No. 48604 and one uncatalogued), Aitape, Australian New Guinea (W. M. Beck), 1945; four (N.H.M.S.U. Nos. 11591–11594), Hollandia, Dutch New Guinea (S. G. Jewett, Jr.), 1945.

DIAGNOSIS: Differs from the typical race primarily in the greater number of rows of scales around the middle of the body (38–42; mean,  $40.1 \pm 0.327$  for 17 specimens).

*Emoia loveridgei*, new species

*Emoia baudinii pallidiceps* (part) LOVERIDGE, 1948, Bull. Mus. Comp. Zool., vol. 101, p. 370.

TYPE MATERIAL: Holotype (M.C.Z. No. 49318), Toem, Dutch New Guinea (W. H. Stickel), May, 1944. Paratypes: Seven (M.C.Z. Nos. 49319–49325), Toem, Dutch New Guinea (W. H. Stickel), 1944; three (M.C.Z. Nos. 44192–44194), Wau, Australian New Guinea (Herbert Stevens), 1933; four (A.M.N.H. Nos. 66685, 66686, and two uncatalogued), Gusika, Australian New Guinea (M. C. Kurtz), 1944; one (C.N.H.M. No. 67264), Toem, Dutch New Guinea (W. H. Stickel), 1944.

DIAGNOSIS: A small *Emoia* apparently most closely related to *E. pallidiceps*, from which it differs in color pattern (see description); the lower number of lamellae, ranging from 27 to 32 (mean,  $29.3 \pm 0.47$ ) for 15 specimens; the relatively shorter limbs and stubbier toes (ratio of length of hind limb to the distance from snout to vent, 42.0, 43.7, 37.8, 39.1, 41.9, 41.9, and 52.0 per cent for seven adult specimens available for measurement at this time<sup>1</sup>); or *E. baudini*, from which it differs primarily in color pattern and less stocky habitus.

<sup>1</sup> When this sample is compared with that of 26 measured specimens of *Emoia p. pallidiceps*, to determine the significance of the difference between the means with respect to this character, the probability, based on Students' *t*, that these samples are

The range widely overlaps that of both *baudini* and *pallidiceps* without evidence of intergradation (fig. 3).

DESCRIPTION: A small *Emoia*, mature specimens 25 to 46 mm. from snout to vent; habitus moderately slender; head narrow; snout short, its length about one-third of the distance from its tip to the anterior border of the ear, bluntly rounded; supranasals roughly rectangular in shape, widely separated, in contact with the anterior loreal which is much shorter but broader (higher) than the posterior; prefrontals large, not in contact; frontal shorter than the frontoparietal; interparietal absent; a single pair of nuchals; supraoculars four plus a small one posteriorly; four supralabials anterior to the one beneath the orbit which is largest, its length slightly greater than one-half of its distance from the rostral; postmental longer than the mental; anterior pair of chin shields in contact; ear opening small, scarcely larger than the palpebral disk, without prominent lobules; 12 rows of scales across the nape from ear opening to ear opening. Scales in 31 to 34 rows around the middle of the body (mean,  $32.6 \pm 0.47$  for 16 specimens); 44 to 51 rows along the mid-dorsal line from the parietals to the base of the tail (mean,  $48.9 \pm 0.541$  for 15 specimens); scales smooth; dorsals only a little larger than the laterals; 27-30 lamellae beneath the fourth toe (mean,  $29.3 \pm 0.47$  for 15 specimens), simply rounded (fig. 5), those of the basal phalanges not markedly broader than those of the terminal phalanx; limbs moderately well developed, length of the hind limb generally less than half of the distance from snout to vent.

COLOR: The color (in preservative) on the dorsum grayish olive to greenish brown, the band six and two-half scale rows in width on the neck and body, somewhat darker on head and tail regions; scales of second row on either side of vertebral line edged with brown laterally; lateral surfaces brown to blackish brown from snout almost to the tip of the tail, extending on the body to the lower level of the limbs, where it merges with the dark slate of the venter; a faint, irregular light line from axilla to groin (absent in some specimens); lips and chin heavily barred with blackish brown. (See fig. 6.)

Two additional species of *Emoia* have often been confused with *baudini*, *pallidiceps*, and *mivarti*, and specimens in various collections used

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not from the same population is .089, which cannot be considered significant. However, if the one aberrant specimen (the smallest, 25 mm., a male), which gave a ratio of 52 per cent is omitted, the probability becomes .02. This may be regarded as significant and suggests that for fully adult specimens this character is a useful one along with the others mentioned.

in the present studies have often been referred to one or the other of these two species. They are in general slightly larger than *mivarti* or *pallidiceps* and can be distinguished from these species and from one another on the basis of a combination of characters, including color pattern, scale counts, and body proportions. One of these, a moderately large, brownish *Emoia* often with light spots on the lateral surfaces, has rather consistently been confused with *baudini* since Boulenger's description (1887, p. 296); it will be dealt with in a separate paper (Dr. L. D. Brongersma, *in litt.*). The second species was described as *E. submetallica* by Macleay (1877). One race of the latter was inadvertently described as *E. mivarti obscura* by de Jong (1927). The present study has revealed four very closely related populations that can readily be distinguished on the basis of consistent differences in certain scale counts and minor differences in color pattern (fig. 6). Because of their obvious close relationship, these four populations are regarded as probably only subspecifically differentiated, even though areas of intergradation are unknown at the present time.

*Emoia submetallica submetallica* (Macleay)

*Euprepis submetallicus* MACLEAY, 1877, Proc. Linnean Soc. New South Wales, vol. 2, p. 69; Hall Sound, Papua, New Guinea.

*Emoia pallidiceps* (part?) DE VIS, 1890, Proc. Linnean Soc. New South Wales, vol. 5, p. 497; St. Joseph River area, Papua, New Guinea.

MATERIAL: Twenty-five (A.M.N.H. Nos. 59002, 59004, 59006–59007, 59011, 59015, 59017, 59020–59022, 59025–59029, 59032–59033, 59189–59196), Mafulu, Papua, New Guinea (Archbold Expeditions), 1933; 14 (A.M.N.H. Nos. 59165–59166, 59168–59171, 59173–59177, 59179–59180, 59182), Kubuna, Papua, New Guinea (Archbold Expeditions), 1933; one (A.M.N.H. No. 59151), Yule Island, Papuan New Guinea (Archbold Expeditions), 1933; one (S.N.H.M. No. 13485), Mafulu, Papua, New Guinea.

Macleay in his brief description (1877, p. 69) does not give such scale counts as number of rows around the middle of the body or number of lamellae beneath the fourth toe. He also mentions only a single specimen from Hall Sound. Mr. Stephen J. Copeland of Sydney, New South Wales, has very kindly assisted me in determining the status of this species by reexamining the pertinent material in the Macleay collections, Sydney University Museum, Sydney, Australia. He states (*in litt.*) that the collection contains three specimens from Hall Sound, labeled *Lygosoma (Euprepis) metallicum* and indicated as cotypes. The number of



midbody scale rows and the number of lamellae beneath the fourth toe are as follows:

SPECIMEN NOS.	MIDBODY SCALE ROWS	FOURTH-TOE LAMELLAE
MR518	36	33
MR519	36	34
MR520	38	33

The present series from Mafulu, on the St. Joseph River drainage, which has its outlet on Hall Sound, and Kubuna on the Kubuna River are

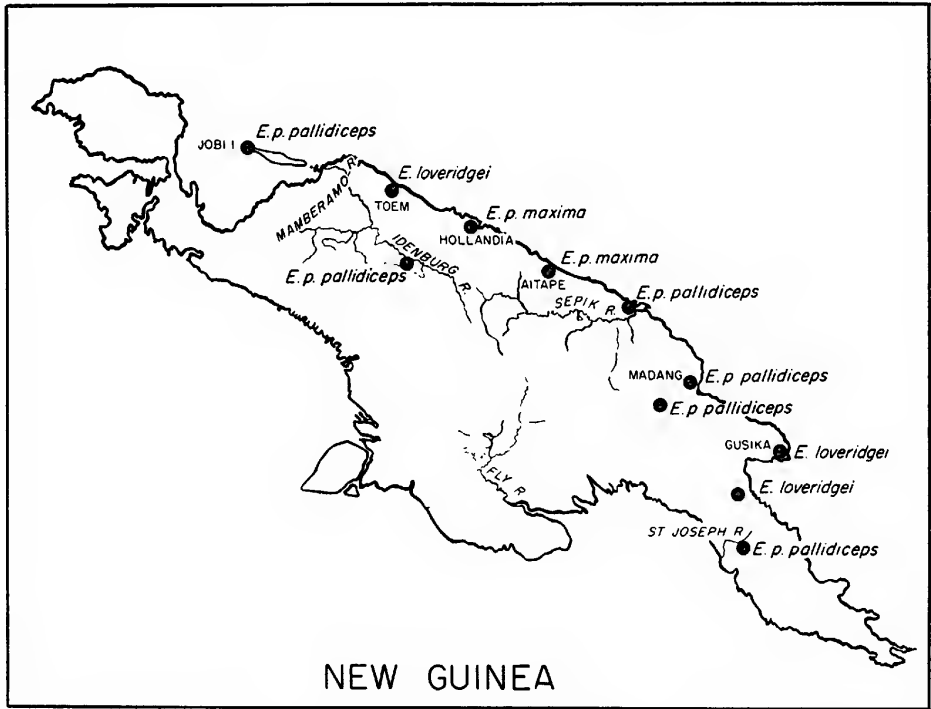


FIG. 3. Known ranges of *Emoia pallidiceps pallidiceps*, *E. p. maxima*, and *E. loveridgei*.

in general agreement with Macleay's series both as to these scale counts and the general color pattern and are therefore referred to *E. sub-metallica*.

DESCRIPTION: An *Emoia* of intermediate size, snout to vent length of mature specimens in the present series 39 to 58 mm.; habitus slender to moderately stocky; limbs well developed, the length about equal to the distance from the axilla to the groin (45.5 to 52.4 per cent; mean,  $49.7 \pm 2.79$  for 14 specimens measured); number of scale rows around the middle of the body 34–38; number of lamellae beneath the fourth toe 31–40 (fig. 5); number of scale rows from the parietals to the base of the

tail 49–58 (see table 4); head only moderately depressed; snout round-pointed; supranasals elongate, triangular, in contact with the anterior loreal, which is much shorter and broader (higher) than the posterior; prefrontals large but separated in all examples in the present series; frontal shorter than the frontoparietal; interparietal absent; a single pair of nuchals; supraoculars four plus a small one posteriorly; four supralabials (rarely five) anterior to the one beneath the orbit, which is the

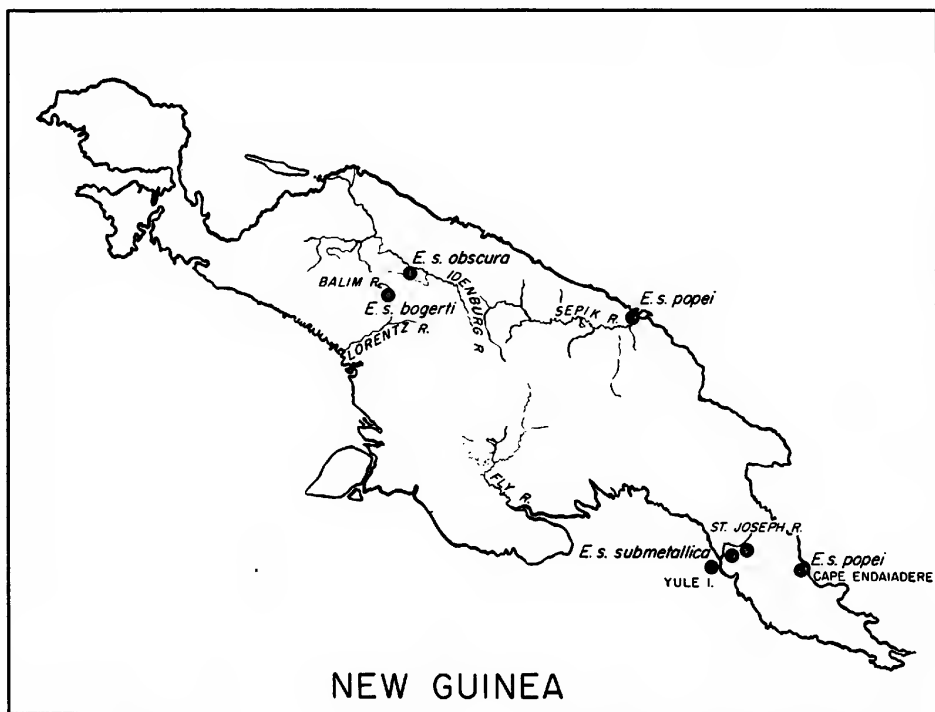


FIG. 4. Known ranges of *Emoia submetallica submetallica*, *E. s. obscura*, *E. s. popei*, and *E. s. bogerti*.

largest, its length generally greater than half of its distance from the rostral; scale rows across the nape from ear to ear generally 10; ear opening with three or four small to moderate denticulations on the anterior border; dorsal scales smooth in adults; limbs and toes relatively long.

COLOR: The color (in preservative) of the broad dorsal band is greenish to greenish brown with a double row of irregular dark brown spots or blotches posterior to the nape which frequently appear as two dark brown, broken, never solid stripes. The broad dorsal band is six to six and two-half scale rows in width; the median unspotted area is two-half to full scale rows in width. The dorsolateral area is frequently

marked by a lighter line or light dots extending posteriorly from the supraciliary region or nape as described by Macleay (1877, p. 169). The upper lateral surfaces are dark brown, varying in breadth from two or three to six or seven scale rows, marked by a line of light spots at the upper level of the limbs, or occasionally with a few scattered spots, rarely a rather wide light band at the level of the limbs (wider than in

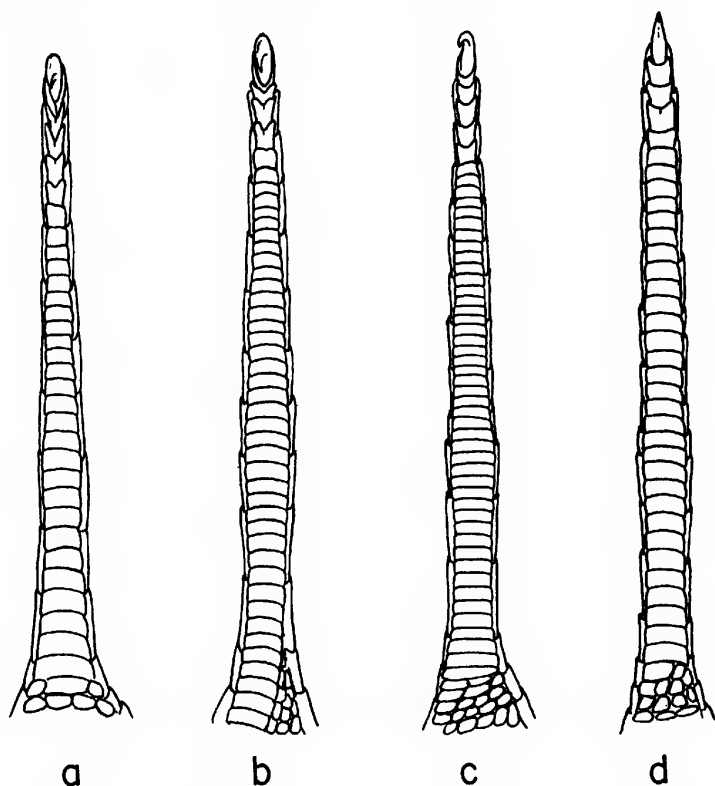


FIG. 5. Lower surface of the fourth toe. A. *Emoia loveridgei*. B. *E. pallidiceps pallidiceps*. C. *E. physicae physicae*. D. *E. submetallica submetallica*.

*E. pallidiceps*), but not distinct anterior to the fore limbs (fig. 6C). The limbs are greenish brown to brown, more or less marked with lighter or darker spots. The lips are not dark barred, but the supralabials are dusky along their upper margins. The venter is greenish white, bluish white to more or less light tan to light slate. The margins of the lower jaw and post-mental region are distinctly lighter than the venter.

RANGE: Known from Yule Island and the St. Joseph and Kubuna River drainages in the Hall Sound area south of the main divide in New Guinea.

*Emoia submetallica obscura* (de Jong)

*Lygosoma mivarti* var. *obscurum* (part) DE JONG, 1927, Nova Guinea, vol. 15, p. 317; Pionierbivak, Mamberamo River, Dutch New Guinea.

MATERIAL: Seven (A.M.N.H. Nos. 62434–62437, 62452–62454), 4 kilometers southwest of Bernhard Camp, Idenburg River, Dutch New Guinea (Archbold Expeditions), 1939.

De Jong (1927, p. 317) described *obscurum*, which he regarded as a subspecies of *mivarti*, very briefly as follows: "Dark olive-brown above, uniform or with still darker spots. Flanks dark-brown or black, no light line from the upper lip through the ear to the groin. No oblique line on the upper arm. Lower parts greenish or whitish."

Professor Engel of the Amsterdam Museum and Dr. Brongersma of the Leiden Museum have most kindly assisted me in determining the status of this population by permitting me to examine two of de Jong's cotypes. Actually one of these specimens has a faint light line along the lateral surface extending from the ear to the groin and is an example of *Emoia p. pallidiceps*; the other is in relatively close agreement with the above series from the Idenburg River, a tributary of the Mamberamo River.

DIAGNOSIS: Differs from the typical subspecies primarily in color pattern (the generally smaller, more isolated, dark spots on the dorsum; the greater tendency for a series of light spots along the dorsolateral line to break up the regular margin of the dark lateral color; the darker chin and lips, only the mental being light), and the generally slightly lower number of midbody scale rows and slightly higher number of subdigital lamellae (table 4).

On account of the extreme brevity of de Jong's description further details are given here.

DESCRIPTION: An *Emoia* of moderate size (46.5 to 62 mm. from snout to vent for five adult specimens); habitus moderately slender; limbs well developed; snout bluntly round-pointed; supranasals triangular, wider anteriorly, in contact with the anterior loreal which is shorter and somewhat broader (higher) than the posterior; prefrontals large but not in contact; interparietal consistently absent; frontal shorter or about equal in length to the frontoparietal; a single pair of nuchals; supraoculars four plus a small one posteriorly; generally four, occasionally five supralabials anterior to the one beneath the orbit, which is the largest, its length about equal to or slightly greater than half of its distance from the rostral; number of scale rows around the middle of the body 33–36; number of lamellae beneath the fourth toe



TABLE 4  
SCALE COUNTS AND BODY LENGTHS (IN MILLIMETERS) OF SUBSPECIES OF *Emoia submetallica*

	Midbody Scale Rows	Fourth-Toe Lamellae	Scale Rows from Parietals to Base of Tail	Snout to Vent Length (Mature Specimens)
<i>E. s. submetallica</i>	$R = 34-38$ $M = 36.3 \pm 0.18$ $N = 39$	$R = 31-40$ $M = 35.0 \pm 0.334$ $N = 40$	$R = 49-58$ $M = 53.5 \pm 0.358$ $N = 39$	$R = 39-58$ $N = 34$
<i>E. s. popei</i>	$R = 38-44$ $M = 40.1 \pm 0.456$ $N = 15$	$R = 36-44$ $M = 40.7 \pm 0.637$ $N = 15$	$R = 47-51$ $M = 48.4 \pm 0.27$ $N = 14$	$R = 44-57$ $N = 15$
<i>E. s. obscura</i>	$R = 33-36$ $M = 34 \pm 0.35$ $N = 7$	$R = 34-41$ $M = 38.3 \pm 0.92$ $N = 7$	$R = 48-53$ $M = 50.6 \pm 0.671$ $N = 7$	$R = 46-62$ $N = 7$
<i>E. s. bogerti</i>	$R = 30-36$ $M = 33.1 \pm 0.165$ $N = 49$	$R = 29-34$ $M = 32 \pm 0.221$ $N = 47$	$R = 59-65$ $M = 60.5 \pm 0.245$ $N = 48$	$R = 40-55$ $N = 49$

*R*, range.  
*M*, mean.  
*N*, number of specimens.

34–41; number of scale rows from the parietals to the base of the tail 48–53; number of scale rows across the nape from ear to ear generally 10; length of hind limb slightly greater than, equal to, or slightly less than, the distance from the axilla to the groin.

COLOR: The color (in preservative) of the dorsum varies from iridescent olive brown (close to biskra, Maerz and Paul, 1930, pl. 15) to new bronze (*op. cit.*, pl. 16). This band is generally six-plus scale rows in width, with one or two rows of darker brown spots on either side, beginning at the nape and extending posteriorly onto the tail. The spots are smaller than a single dorsal scale. The lateral surfaces to the lower level of the limbs are darker brown, more or less marked by scattered whitish or pale blue spots covering a single scale ventrad to the upper level of the limbs, and broken along the dorsolateral line by a series of whitish spots, which are generally smaller than a single scale (fig. 6D). Limbs are brown with scattered darker and lighter spots. The venter is whitish or grayish, darker on the tail and the throat and chin; only the mental is lighter. The lips are dusky or faintly barred.

RANGE: Known from the Mamberamo drainage system (see fig. 4).

*Emoia submetallica popei*, new subspecies

TYPE MATERIAL: Holotype (C.N.H.M. No. 65316), Marienberg, Australian New Guinea (W. A. Weber and F. C. Wonder), 1929. Paratypes: Fifteen (C.N.H.M. Nos. 14127, 14149, 65306–65315, 65317–65318), Marienberg, Sepik River area, Australian New Guinea (W. A. Weber, F. C. Wonder, and K. P. Schmidt), 1929; one (C.P.S. No. 4323), Cape Endaiadere, Papua, New Guinea (W. C. Brown), 1944.

DIAGNOSIS: Differs from the typical subspecies primarily in some features of the color pattern (the dark spots do not tend to be in narrow lines; there is no tendency to show a light line between the axilla and groin); in the slightly greater number of midbody scale rows and the greater number of subdigital lamellae (table 4); and from *E. submetallica obscura* by even greater differences in the number of midbody scale rows and more suffuse, dark, dorsal markings (fig. 6E).

RANGE: Known at present from Sepik River and Cape Endaiadere areas. (See fig. 4.)

*Emoia submetallica bogerti*, new subspecies

TYPE MATERIAL: Holotype (A.M.N.H. No. 61911, an adult male), Balim River Camp, Balim River, Dutch New Guinea, approximately latitude 4° 10' S. and longitude 139° E. (Archbold Expeditions), 1938. Paratypes: Forty-eight (A.M.N.H. Nos. 61902–61910, 61912–61924,

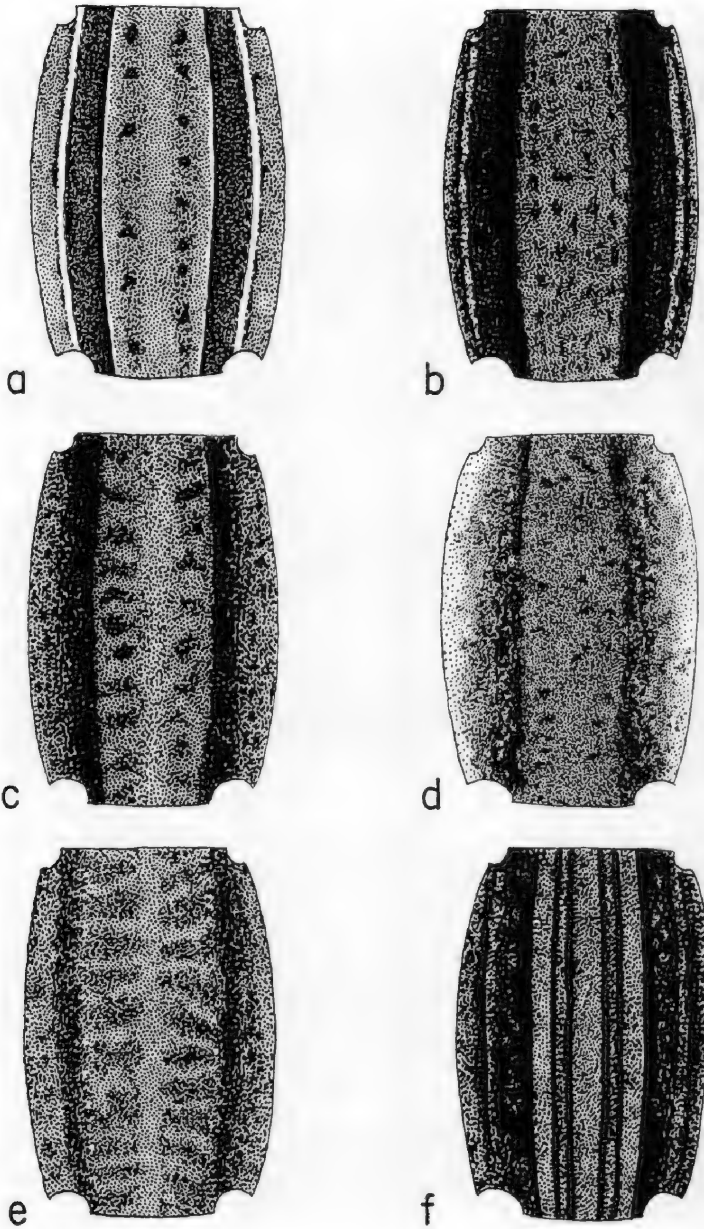


FIG. 6. Color pattern of the dorsal and lateral surfaces of the body. A. *Emoia pallidiceps*. B. *E. loveridgei*. C. *E. submetallica submetallica*. D. *E. s. obscura*. E. *E. s. popei*. F. *E. s. bogerti*.

61926-61951), same data as holotype; one (N.H.M.S.U. No. 13486), same data as holotype.

DIAGNOSIS: Differs from the other races primarily in the higher

number of scale rows along the middorsal line from the parietals to the base of the tail; in some features of the color pattern (the greater tendency for the dark brown on the dorsum to appear as four more or less separate, narrow, brown lines; the more marbled, dark and light pattern of the lower lateral surfaces) and the generally slightly smaller size (see table 4).

RANGE: Known only from the Balim River area<sup>1</sup> (see fig. 4).

### THE *PHYSICAE* GROUP

A second group of relatively large *Emoia*, of which the known range is limited to New Guinea and a few of the islands immediately to the west, retains the presumably primitive characteristic of keeled dorsal scales throughout adult life. Six, possibly seven, descriptions in the literature refer to the members of this group: *E. acrocarinatum* (Kopstein), 1926; *E. battersbyi* (Proctor), 1923; *E. concolor* (Duméril), 1851; *E. klossi* (Boulenger), 1914; *E. physicae* (Duméril and Bibron), 1939; *E. tropidolepis* (Boulenger), 1914; and possibly *E. simillimus* (Macleay), 1877.

The members of this group have been little collected, and no large series of any of the above species is available to me. *E. concolor* is from Ambon Island west of New Guinea (Jacquinot and Guichenot, 1853, p. 113), the others were described from New Guinea. In view of the lack of material and the brevity of some of the earlier descriptions, there is no adequate basis for resolving problems of possible synonymy or sub-specific relationship at this time, except in the instances of *E. physicae* and *E. tropidolepis*. These two are identifiable in the material available to me, which also includes examples of a heretofore undescribed population.

#### *Emoia physicae physicae* (Duméril and Bibron)

*Euprepes physicae* DUMÉRIL AND BIBRON, 1839, *Erpétologie général*, vol. 5, p. 688; New Guinea.

MATERIAL: One (M.C.Z. No. 7682), Pom, Jobi Island, Dutch New Guinea (Thomas Barbour), 1902; ?one (M.C.Z. No. 44191), Wau, Marobe District, Australian New Guinea (H. Stevens), 1933; two (A.M.N.H. Nos. 66724–66725), Lae, Australian New Guinea (M. C. Kurtz), 1944; four (C.N.H.M. Nos. 15529–15530, 36616–36617),

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<sup>1</sup> The Balim River is a part of the Lorentz drainage (Archbold, Rand, and Brass, 1942, p. 208).



Marienberg, Sepik River, Australian New Guinea (W. A. Weber and F. C. Wonder), 1929; one (C.P.S. No. 4320), Cape Endaiadere, Papua, New Guinea (W. C. Brown), 1944.

Since Boulenger (1887, p. 296) placed this species in the synonymy of *E. baudini*, it has not been seriously restudied. It is distinct in a number of characters and not closely related to that species.

The present series is in close agreement with the description of Duméril and Bibron with respect to details of scalation of the head, the keels on the dorsal scales, and the color pattern; and though the number of lamellae beneath the fourth toe is slightly higher in general [40 to 49 for eight specimens, and one 35 (M.C.Z. No. 44191), as compared to 38 given for the type], the range is such as to suggest that this is a relatively variable character in this species.

The reference of M.C.Z. No. 44191 from Wau, Australian New Guinea, to this form is indicated as questionable, as I have not seen the specimen for some time and have not sufficient notes on color pattern to be positive that it is in closer agreement with this subspecies or with *tropidolepis*.

**DESCRIPTION:** A moderately large *Emoia* (available mature specimens, 60 to 75 mm. from snout to vent); habitus moderately stocky; head not strongly depressed; snout bluntly round-pointed; supranasals triangular, their broad bases against the rostral, not in contact with each other but generally in contact with the anterior loreal or nearly so on either side; anterior loreal shorter and broader (higher) than the posterior; prefrontals separated; interparietal absent; frontal slightly longer or equal to the frontoparietal; a single pair of nuchals; supraoculars four plus a small one posteriorly; four or five (in one specimen six) supralabials anterior to the one beneath the orbit, which is the largest, its length about half or slightly more than half of its distance from the rostral; number of scale rows around the middle of the body 32–38; number of lamellae beneath the fourth toe 40 (35?)–49; number of scale rows along the middorsal line from the parietals to the base of the tail 50–55; limbs well developed, the length of the hind limb only slightly greater than, equal to, or less than, the distance from the axilla to the groin.

**COLOR:** The color (in preservative) on the dorsal and lateral surfaces is dusky brown (autumn or bracken to mandalay, Maerz and Paul, 1930, p. 38, pl. 8) with small, scattered, dark brown spots on the posterior part of the body and tail. There is a somewhat indistinct, irregular, dark brown band (one to two scale rows in width) extending from the neck region to the region of the hind limb in adult specimens from the Sepik

River area. The juvenile specimen from Cape Endaiadere is darker on the lateral surfaces with some scattered whitish spots most prominent along the dorsolateral line. This is remindful of the somewhat indistinct, light, dorsolateral line on the neck and anterior part of the body in *E. tropidolepis*. The venter is creamy white, greenish white, or tan; the ventrolateral surfaces are more or less grayish on the trunk and throat.

RANGE: Known at present in northern New Guinea from Cape Endaiadere to Jobi Island.

*Emoia physicae tropidolepis* (Boulenger)

*Lygosoma tropidolepis* BOULENGER, 1914, Trans. Zool. Soc. London, vol. 20, p. 260, pl. 29, fig. 4; Mimika River area, Dutch New Guinea.

MATERIAL: One (M.C.Z. No. 21001), Bivak Island, Dutch New Guinea, 1925; one (A.M.N.H. No. 58394), Tarara, Papua, New Guinea (Archbold Expeditions), 1937; three (A.M.N.H. Nos. 59008, 59013, 59016), Mafulu, Papua, New Guinea (Archbold Expeditions), 1933.

This series of five specimens is in generally close agreement with Boulenger's description (1914, p. 260), though the range of the number of midbody scale rows and the number of lamellae is slightly greater: midbody scale rows 36–40 (instead of 34–36), fourth-toe lamellae 36–40 (instead of 34–38). It is possible that more extensive future collecting may show the population of the Papuan Gulf region to be subspecifically differentiated from the population of the Mimika and Setekwa rivers to the west.

*Emoia physicae tropidolepis* as represented by the present sample differs from the typical subspecies in the slightly lower number of subdigital lamellae, the generally darker color of the lateral surfaces, the more or less distinct, light, dorsolateral stripe extending from the supraciliary region to a point above the axilla or between the axilla and the groin, and the more general dark spotting of the dorsum.

RANGE: Known at present from the Mimika River area and some of the drainages on both the western and eastern shores of the Gulf of Papua. These localities are south of the main mountain range.

*Emoia physicae oribata*, new subspecies

TYPE MATERIAL: Holotype (A.M.N.H. No. 62414, an adult female), 850-meter camp on Araucaria Creek (5 kilometers southwest of Bernhard Camp on the Idenburg River), Dutch New Guinea, (Archbold Expeditions), 1939. Paratypes: Two (A.M.N.H. Nos. 62413, 62415), same data as holotype; one (A.M.N.H. No. 62433), 1200-meter camp

(9 kilometers southwest of Bernhard Camp on the Idenburg River), Dutch New Guinea (Archbold Expeditions), 1939.

**DIAGNOSIS:** Differs from the typical subspecies primarily in the slightly lower number of subdigital lamellae (35–39 for four specimens) and in the color pattern. The dark brown spots on the dorsum tend to be more or less fused diagonal bars on the anterior part of the body, and the lateral surfaces of the head and body from the postorbital to the axillar region are irregularly marbled with blackish brown and grayish white. Differs from the subspecies *tropidolepis* in the above-mentioned features of the color pattern and in lacking the light dorsolateral stripe on the neck and anterior part of the body.

**RANGE:** Known at present from the south slopes of the Idenburg Valley.

*Emoia acrocarinatum* (Kopstein)

*Lygosoma acrocarinatum* KOPSTEIN, 1926, Zool. Meded., vol. 9, p. 95; Jakati River, Bentoni Bay, Dutch New Guinea.

**MATERIAL:** Five (C.N.H.M. Nos. 15484, 14197, and three uncatalogued), Waigeu Island, Dutch East Indies (Karl P. Schmidt), 1929.

The present series indicates that this species is quite distinct from *E. physicae tropidolepis* and that the placing of *E. acrocarinatum* in the synonymy of *E. tropidolepis* by Brongersma (1931, p. 27), who apparently lacked comparative material, was in error.

*Emoia acrocarinatum* differs from *physicae* in a number of characteristics. The number of midbody scale rows is greater (40–44, type given as having 38); there are fewer scale rows along the middorsal line between the parietals and the base of the tail (45–48); distinct nuchals are consistently absent; and the head is narrow and tapering, not perceptibly broader than the neck. *E. acrocarinatum* has the same stocky appearance that characterizes *E. baudini*. The present series also suggests that *E. acrocarinatum* may be a smaller lizard than known races of *E. physicae* (51 to 55 mm. from snout to vent for the present series).

**COLOR:** The color (in preservative) is in reasonably close agreement with Kopstein's description. The dorsal ground color varies from near cochin (Maerz and Paul, 1930, pl. 7) to autumn or cattail (*op. cit.*, pl. 8) diffusely spotted with darker brown on the body, especially the posterior part and on the base of the tail. The lateral surfaces are darker brown extending from the region of the ear or fore limb posteriorly to a point on the basal half of the tail where the color gradually tapers and fades. A series of widely spaced light spots mark the dorsolateral line on neck

and most of the body, and the base of the tail. A similarly narrow, moderately distinct, light line extends from the axilla to the groin. The lower lateral surfaces and the sides of the neck are varyingly marked by scattered light spots. The labials tend to be dusky or dark barred as described by Kopstein, especially the upper ones, but a very distinctive light band extends vertically from the posterior angle of the eye across the lips. A light diagonal bar across the upper fore limb is present in three of the four adult specimens. The venter is white to bluish white.

### INCERTAE SEDIS

*Euprepis simillimus* MACLEAY, 1877, Proc. Linnean Soc. New South Wales, vol. 2, p. 69; Katow, New Guinea.

Macleay's description is too brief to make identification of this species possible, but the mention of keeled scales suggests that it may refer to a species of the *physicae* group.

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